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Walnuts and Hazelnuts as commodity crops in the UK

Written by:

Tom McVeigh NSch

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A NUFFIELD FARMING SCHOLARSHIPS REPORT

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A NUFFIELD FARMING SCHOLARSHIPS REPORT (UK)

NUFFIELD Farming Scholarships

"Leading positive change in agriculture. Inspiring passion and potential in people."

Date of report: 15.06.2026

Title	The viability of walnuts and hazelnuts as commodity crops for UK farmers
Scholar	Tom McVeigh
Sponsor	Beckett Award
Objectives of Study Tour	To understand propagation, production, processing and marketing of walnuts and hazelnuts and whether these can make for viable crops in the UK.
Countries Visited	USA (Oregon), Chile, Italy, Spain, France, Netherlands, Belgium, Denmark, UK
Messages	UK Agriculture is in a moment of profound peril. Seismic changes in policy, climate and global cereal prices have left many UK farms in an untenable position. We must do more than just adapt, we need to innovate, and rapidly, if we are to take back control of our futures from the factors outside of our influence. Whilst this study finds that walnuts are unlikely to be suitable for commodity production in the UK, hazelnuts combine agronomic suitability along with strong market conditions and vast potential for UK farmers.

EXECUTIVE SUMMARY

This study was undertaken in reaction to a sequence of problems faced by UK farmers. The first is that global cereal prices are inadequate to sustain farming businesses without government support. The second, that government support is subject to the election cycle – which is too short term and volatile to give *us* the confidence to invest in *it*. And finally, the environmental expectations and challenges for farmers are only increasing.

My research aim was to find**: A high value crop, with a low labour requirement that would yield in a changing climate.**

Such a search led me to investigate everything from apples, pears, soft fruit, asparagus and novel grains before centring on walnuts and hazelnuts for two reasons. One, they are perennial and therefore **less affected by annual weather patterns** and two, **non-perishable**, which increases the marketing window and assists mechanisation of their production systems. The other criteria for this study were that these crops had to be produced **already in the UK**, to reference available data points.

I have formulated two conclusions. **Walnuts will not work**, they are naturalised to the UK ,not native, and so productivity is unreliable, but more importantly the global market is one of oversupply, consolidation and low prices. However, **hazelnuts** are not just native, but prolific in the UK. They exist within a **thriving commodity market** driven not just by advancements in agronomics, genetics and mechanisation; but by necessity, as existing producer countries struggle with climate instability while producing their crops. In 2025, the world produced approximately 35% less hazelnuts than in 2024 with countries such as Spain and Italy facing consistent downward trends in productivity over a number of years.

The **UK is well placed** – because of our more temperate climate, to capture some of this lost production. However, the opportunity is much larger than simply replacing lost production. Across Europe many orchards are over 20 years old, **using inferior varieties**, designed in **outdated ways** and producing suboptimal crops. The UK has a unique advantage of being able to take the **best practice** from across the world's different production systems, and apply it in within our own context.

However, there are barriers preventing UK adoption of hazelnut production. Not because of production, but because of *producers*. Success in this sector will depend upon both **standardisation of production** (growing the same varieties at the same specification) and **centralisation of processing (**to enter the market at a competitive scale). This is because you don't process a hazelnut to add value, you process it to access the market, and therefore doing so at the **lowest possible cost per unit**, is imperative.

As a result of this study, I and a group of farmers have formed the **British Hazelnut Association** and won funding through the ADOPT innovation grant to undertake a nationwide varietal trial across **20 farms in the UK**, ensuring we understand how different varieties react in specific UK climates. By understanding optimal genetics (meeting market specification requirements) we will be able to begin piecing together a competitive and **sustainable production system** which can be replicated broadly across the UK, for UK farmers.

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DISCLAIMER

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Whilst every effort has been made to ensure the accuracy of the information presented, no warranty is given regarding the completeness, accuracy or future applicability of any data, forecasts or conclusions contained within this report. Market conditions, production costs, legislation, climatic conditions and commercial opportunities may change over time.

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The views expressed within this report are those of the author and do not necessarily reflect the views of Nuffield Farming Scholarships Trust, its sponsors or any individuals or organisations visited during the course of the study.

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CHAPTER 1: INTRODUCTION

I didn't return to run my own family farm in Suffolk until after the phase out of the BPS (Basic Payment Scheme) began in 2020 and, in many ways, **I did so because of it**. I recall standing in a field of winter wheat one day, reflecting that I was growing a crop that my grandfather who farmed in Northern Ireland, would recognise instantly. (I am now the 13th generation of farmer in my family.) The **varieties had changed**, the **machinery had changed** and **policy had changed**, but the fundamental business model remained remarkably similar.



Figure 1: The author, Tom McVeigh, pictured in a coppice on his own farm

At the same time, costs were unrecognisable, the **margins had collapsed**, policy had stated my production system was degrading the landscape, and climate instability was becoming harder and harder to ignore. Three years of studying agriculture at university and a few more years working away still couldn't have prepared me for the business I was beginning to run. After a few years tweaking the farming system, **reducing fixed costs** here, **lowering variable costs** there, **spreading risk** through broadening rotation and finding premium markets for certain products, I believed I could build back **a thin margin**- only for a global event (covid) to occur overnight and once again eradicate any profit margin forged over those years of effort and risk taking. **There have been two more global events since** (Ukraine, Iran). This is not a unique experience on my farm, yet it is what makes the *farming* experience *unique*. Other industries and sectors **would not continue** to operate business models which **fundamentally don't work**. As I planned my future within this industry my thoughts rested on three factors which I could not depend on: **Globalised cereal prices. Government policy. Consistent growing seasons.**

I started to wonder what other crops I could grow and drew out my wish list: three items. **High value. Low labour. Yield in a changing climate.** It was trying to discover, what, if anything sat in the middle of this Venn diagram which has

occupied the past 5 years of my life. The question led me to investigate top fruits, soft fruits, novel grains, energy crops, some things which to this day, I can neither spell nor pronounce. Eventually I centred on walnuts and hazelnuts for two reasons. They are **perennial**, and therefore less affected by annual weather patterns and, secondly, **non-perishable**, which means their marketability is global and their production is mechanised.

Further research found **a historic domestic industry** of nut production in the UK, which for all intents and purposes no longer exists outside of niche and cottage industry production. Simultaneously, the UK **was importing tens of thousands** of tonnes of walnuts and hazelnuts each year at eye watering prices. Quick calculations based upon prospective yield expectations of the existing growers I'd met, along with those imported prices, led me to believe these crops were **worth investigating further**.

In 2021 I planted my first thousand walnuts and hazelnuts. Quickly I became aware of all the questions I needed to answer but had entirely inadequate resources to: so I applied for a Nuffield Farming Scholarship.

This paper is the result of access to people, places and knowledge I could not have dreamt I'd have been able to reach when the idea first struck my mind.

CHAPTER 2: BACKGROUND TO MY STUDY SUBJECT

2.1 Background

UK arable farming faces a period of **profound peril**. We have experienced low prices before and we have experienced poor harvests before. What we've never experienced is the withdrawal of subsidy support which was designed to help mitigate these uncontrollable risks. **Volatile commodity market**s, **increasing production costs and climate instability** are all occurring simultaneously, and the **only mitigation tool has been removed**. For many businesses, the traditional economic model of arable farming is under significant threat.

The UK currently has approximately 4.1 million hectares of arable land in production, compared with only around 15,000 hectares of commercial orchard crops. As a result, the agricultural landscape is overwhelmingly dominated by annual crops, while perennial food-producing systems remain a very small component of UK agriculture.

Perennial horticultural crops offer a number of **advantages**. They are often capable of generating significantly **higher returns** per hectare than conventional arable crops and can provide **environmental benefits** through reduced soil disturbance, increased carbon storage and enhanced biodiversity. However, these opportunities are accompanied by **substantial barriers** to adoption.

Many horticultural enterprises **rely on highly localised** supply chains and concentrated markets. For example, cider apple production is dominated by a small number of processors in specific geographies, while sectors like top fruit and viticulture require **vast upfront investment**, often exceeding £70,000 per hectare. In addition, these producers operate within markets where profitability is heavily influenced by cosmetic standards, consumer preferences and rapidly changing retail requirements. For those growers, producing a successful crop is only part of the challenge: understanding and anticipating market demand is equally important.

These factors have meant the **scalability** of many perennial horticultural crops is **limited despite their profitability**. The capital requirements, technical complexity and market risks create significant barriers for farmers considering diversification away from conventional arable production.

Despite these challenges, the need to explore alternative cropping is apparent. Many arable businesses are **struggling** to generate sustainable returns from existing crop rotations and mitigate through expansion; but achieving greater economies of scale does not balance the increasing risk caused by exposure to yield and price volatility. This raises an important question: **Are there perennial crops capable of combining the scalability and market structure of**

commodity agriculture with the profitability and climate resilience often associated with perennial horticulture?

The UK is dependent on imported nuts, with 99.9% of both hazelnuts and walnuts consumed domestically being sourced from overseas. Unlike many agricultural commodities, global nut production is highly concentrated geographically. **More than half** of the world's walnuts are produced in California, while approximately **65%** of global hazelnut production is in Turkey. This concentration creates both opportunities and risks. While production regions benefit from economies of scale and efficient supply chains, the global market becomes increasingly **exposed to climatic shocks**, **pest pressures** and **geopolitical disruption.**

Walnuts present a slightly different opportunity to hazelnuts. While both are storable products, walnuts typically have a shorter commercial shelf life, often around nine months compared with up to two years for hazelnuts. As a result, domestic production may offer the ability to supply a **fresher product** with reduced storage requirements. This could be particularly advantageous in premium retail and direct-to-consumer markets, where freshness is closely linked to eating quality.

Hazelnuts are fascinating because they operate within a relatively unique market structure. Hazelnuts are bought and sold based on a set of specifications of which the most important is size. 70% of world demand is for **11-13mm nuts**, 25% for 14-16mm and 5% for 17mm+. There are also premiums within those size brackets for **flavour profile** and **kernel-to-shell ratio**.

Demand is dominated by the **confectionery sector** and a small number of multinational companies. The largest of these is Ferrero, whose portfolio includes Nutella, Kinder, Kellogg's and Ferrero Rocher. Ferrero alone is estimated to account for around **30% of global hazelnut consumption**.

The nature of this demand is important. Consumption is driven not by the nut itself, but by **established consumer products**. As a result, the demand is relatively **inelastic;** manufacturers require a consistent supply of hazelnuts regardless of short-term fluctuations in production. When combined with a crop that is heavily concentrated in a small number of production regions, this creates a market that is particularly **sensitive to supply shocks**.

Recognising these risks, Ferrero has invested heavily in expanding production outside traditional growing regions. Chile has emerged as a major focus, benefiting from favourable growing conditions and a production season opposite to that of the Northern Hemisphere. This geographical diversification reduces supply risk while providing processors with a more consistent year-round supply. As a result, Chile is expected to become one of the world's leading hazelnut-producing nations within the coming decade.

For countries such as the UK, these developments raise an interesting question. If major global buyers are actively seeking to **diversify production** geographically, which new production regions **emerge** beyond the traditional heartlands of Turkey, Italy and the United States?

2.2 Why Walnuts Were Ultimately Rejected in this study

At the outset of this study, walnuts appeared to offer many of the same advantages as hazelnuts. They are a **perennial** crop, can be mechanically harvested and command a significantly **higher value per hectare** than conventional arable crops. Furthermore, the United Kingdom imports almost all of its walnuts, suggesting an apparent **opportunity for domestic production**.

However, as the study progressed, several factors led me to conclude that walnuts are **unlikely** to become a commercially significant commodity crop for UK farmers.

The first is reliability of production. Whilst hazelnuts are native to the United Kingdom and thrive across a wide range of environments, walnuts are **naturalised** (they were imported by the Romans). So they're more vulnerable to climatic variability, in particular late spring frosts. From data acquired by walnut farmers in the UK, yields also do not contend with those of major producer countries. For a commodity crop, consistency of production is as important as absolute yield, and this variability creates **substantial commercial risk**.

Secondly, the global walnut market currently faces structural challenges. Production has become increasingly concentrated, particularly within California, where large-scale mechanised operations dominate global supply. Over recent years, **production** growth has **outpaced demand**, resulting in periods of oversupply and sustained **downward pressure** on prices.

Processing also presents a greater challenge than is often appreciated. Unlike hazelnuts, walnuts are significantly **more difficult** to crack cleanly. Achieving a high proportion of intact kernel halves is critical to product value, yet doing so requires sophisticated processing equipment and careful handling throughout the supply chain. Small reductions in kernel quality can have a disproportionate impact on the value of the final product. Consequently, processing infrastructure represents a larger technical and economic **barrier** than in comparable hazelnut systems.

Taken together, these factors led me to conclude that while walnuts will continue to have a role within specialist, localised or premium markets, they are unlikely to provide the foundations for a **scalable** UK commodity industry. Hazelnuts, by contrast, demonstrated greater climatic suitability, stronger market fundamentals and a **clearer pathway** towards industry development. For this reason, the remainder of this paper will focus only on hazelnuts.

CHAPTER 3: MY STUDY TOUR

3.1 My Study Tour

The locations selected for this study were chosen to answer specific questions relating to the viability of a UK nut industry. Each region represented a different stage of industry development, allowing **comparisons** between production systems, business structures and **routes to market**.

Oregon, USA, was a particularly important destination. Home to Oregon State University's hazelnut breeding programme, it possesses the **most advanced** and scientifically developed hazelnut industry in the world. The breeding programme has focused on **reducing tree size** to increase plant density, **improving yield** per tree, increasing **kernel-to-shell ratios** and developing nuts **that meet the size specifications** required by the market. However, genetics alone do not create successful industries. I therefore sought to understand how these cultivars were integrated into commercial production systems, including orchard design, nutrition programmes, pest and disease management, and the mechanisation of harvesting and processing.

Italy represents a contrasting model. As the historic heartland of European hazelnut production and the home of Ferrero, it is recognised globally for **quality**, provenance and tradition. The Italian industry provided an opportunity to examine how a mature sector maintains premium market positions and how processors, growers and buyers interact within an **established supply chain**. As with many traditional production system, it was interesting to compare which actions were undertaken through **force of habit** and which were vital.

Chile offered a different perspective again. The country's hazelnut industry is relatively **young** and has **expanded rapidly** over the past two decades. In many respects, Chile combines the genetic and mechanisation advances seen in Oregon with the market relationships and processing structures traditionally associated with Italy. Significant investment from Ferrero has accelerated this growth, making Chile one of the **most important emerging regions** in the world.

Climate was another important factor influencing my choice of study locations. Traditionally, the global hazelnut industry has been concentrated within a relatively narrow geographic band, with **Turkey, Italy and Spain** accounting for the majority of production. However, many growers and industry stakeholders highlighted increasing **concerns** around **summer drought**, **water availability**, extreme heat events and increasingly **unpredictable weather patterns**.

While these regions remain productive, climate change is beginning to influence decisions around future investment and expansion.

In response to these challenges, a gradual shift northwards is beginning to emerge. Commercial hazelnut plantings are being established in the

Netherlands, Belgium and Denmark; regions that historically sat outside the industry's conscious production zones. Although these industries remain small, they represent an important trend. Investors, processors and growers are increasingly looking beyond traditional production regions in search of climates capable of delivering **consistent productivity** over the coming decades. This element of the travel allowed me to make **direct comparisons** for commercial hazelnut production in climates almost **identical to our own**.

Collectively, the regions visited provided examples of three distinct pathways to industry development: a **research-led** model, a **heritage-driven** model and an **emerging innovation**-led model.

They also highlighted an industry in **transition**, adapting to changing climatic conditions and searching for **new regions** capable of supporting **future production**. Understanding the strengths and weaknesses of each system was critical in assessing whether the United Kingdom could become part of the **next generation** of commercial nut-producing nations.

CHAPTER 4: WHAT MAKES A SUCCESSFUL NUT INDUSTRY

4.1 Genetics and Yield

Yield is influenced by many factors: some within the control of the grower and others determined by the environment. However, **yield potential** is fundamentally governed by genetics. As in arable farming, yield is one of the most important **drivers of profitability**, allowing fixed costs to be spread across a greater volume of production and **reducing the cost** of production per kilogram.

The productivity gap between traditional production systems and modern orchards established using improved genetics was striking. Across every country visited, modern American cultivars appeared to outperform traditional local ones. This was evident not only in Oregon, where the varieties were developed, but also in Chile and increasingly within Europe. Improvements in **yield, nut quality**, and **suitability for mechanised** harvesting have transformed the economics of production.

The impact of these genetic improvements can be seen in the significant variation in yields and production costs observed between producing regions.

While labour costs, mechanisation and scale **all contribute** to these differences, yield appears to be a **dominant factor**. Oregon and Chile achieve almost double the yield of Italy and nearly four times that of Turkey, resulting in dramatically **lower production costs**. This suggests that future competitiveness of the global hazelnut industry will be determined less by geography and more by the **adoption of improved genetics** and **modern production systems**.

For potential emerging regions like the United Kingdom, this finding is significant because new entrants are **not constrained** by legacy orchards and therefore can **establish modern**, **highly productive** systems from the outset.

Table 1: Cost of production in various countries. Source : Confidential

Region	Cost of Production ($/kg)	Yield (t/ha)
Turkey	3.45	0.8
Italy	2.30	1.6
Chile	1.30	3.0
Oregon	1.20	3.0

4.2 Climate and Site selection

To understand optimal climate and site selection, we must understand the growing needs of the plant, which require a **surprisingly narrow set** of climatic parameters. Hazelnuts require a period of **winter chilling** (approx. 1200 hrs below 5 degrees Celsius) to break dormancy and support flowering. Insufficient winter chill will dramatically reduce pollination and subsequent yields.

Once pollinated they favour **sunny springs**, particularly between March and May. It's at this time when 'nut set' occurs, hence the trees' requirement for energy from the sun via photosynthesis.

Equally important is the avoidance of **extreme summer temperatures**. While hazelnuts can tolerate periods of heat, prolonged exposure to high temperatures can **reduce** kernel development, **increase stress** and negatively affect yield and quality. Often in such conditions, the tree will simply shed unfilled nuts before maturity. We would broadly quantify the maximum sustained temperature to be below 35 degrees Celsius.

While climate dictates where hazelnuts can be grown, site selection determines whether they can be **grown profitably**. Across all regions visited, successful orchards were typically established on **well drained soils** with sufficient depth to support root development and access to moisture during dry periods. **Waterlogging** was identified as a **greater threat** than drought, particularly during establishment.

Successful orchards were found on a **wide range** of soil types: both lighter soils and heavier clay loams where drainage had been effectively managed. This suggests that soil management and site preparation may be more important than soil texture alone. Quoting farmer Jorge Mohr: **"A farmer should consider the priorities in this order: Climate, then water, then soil – because amendments can always be made to soil".**

These findings suggest suitable climates and soils exist across a much wider geographic area than current production patterns would suggest. Applying these specific climatic criteria to the UK and comparing them with producer regions presents an optimistic picture for the UK's potential.

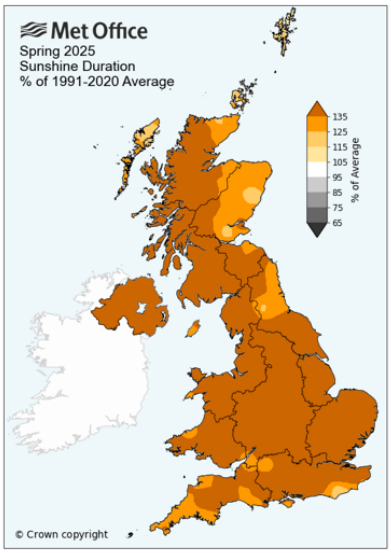
The tables below compare UK data and that of other producer regions.

I obtained the tables and figures below from the Met Office online. The first 2 charts shows spring sunshine in 2025 and 2026 vs average previous years. The sunshine hours are annual and indicative.

Further charts below show Chill hours and rainfall.

Please see charts overleaf

Sunlight hours



Location	Sunshine Hours (hrs/year)
Suffolk (East Anglia)	**1,600–1,750**
Kent (SE England)	**1,700–1,900**
Leicester (Midlands)	**1,400–1,550**
Shropshire	**1,350–1,500**
Bristol	**1,300–1,450**
Willamette Valley (Oregon)	**2,000–2,200**
Osorno (Chile)	**1,450–1,600**
Giresun (Turkey)	**1,400–1,650**
Piedmont (Italy)	**2,000–2,200**

Comments

- At least 15% spread in accuracy of figures.
- We're interested in spring sunlight hours for nut set.

Figure 2: Chart to show Sunlight hours in Spring 2025

Location	Sunshine Hou (hrs/year)
Suffolk (East Anglia)	**1,600–1,750**
Kent (SE England)	**1,700–1,900**
Leicester (Midlands)	**1,400–1,550**
Shropshire	**1,350–1,500**
Bristol	**1,300–1,450**
Willamette Valley (Oregon)	**2,000–2,200**
Osorno (Chile)	**1,450–1,600**
Giresun (Turkey)	**1,400–1,650**
Piedmont (Italy)	**2,000–2,200**

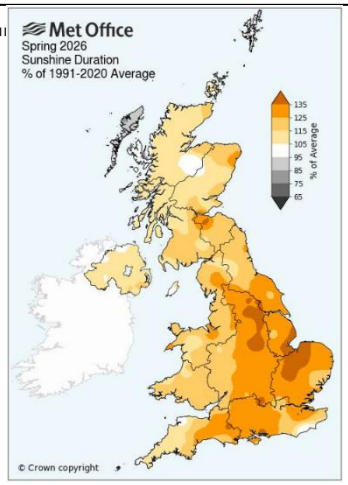
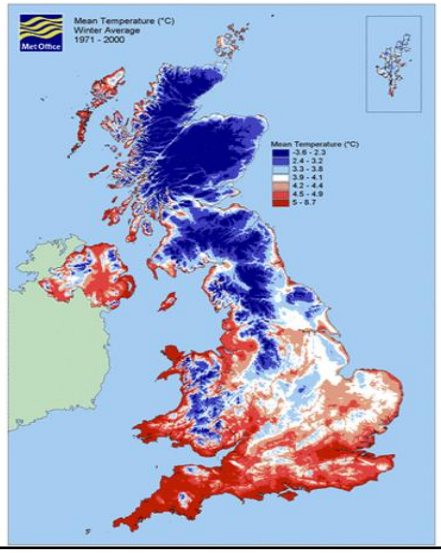


Figure 3 Chart to show Sunlight hours in Spring 2026

Chill hours



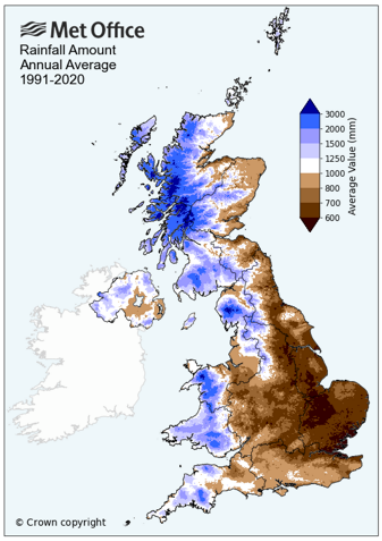
Location	Chill Hours (<5°C)
Suffolk	**1,000 – 1,200**
Kent	**900 – 1,100**
Leicester	**1,200 – 1,400**
Shropshire	**1,200 – 1,400**
Bristol	**800 – 1,000**
Willamette Valley (Oregon)	**1,200 – 1,500**
Osorno (Chile)	**800 – 1,100**
Giresun (Turkey)	**900 – 1,200**
Piedmont (Italy)	**700 – 1,000**
Catalonia (Spain)	**500 – 800**

- Hazelnut trees need approx. 1000 chill hours per year

Figure 4: This table shows the mean average temperature over winter in 2025 vs previous years.

The chill hour data I accumulated online for the other regions.

Rainfall



Location	Winter Rainfall (mm)
Suffolk	**150–220 mm**
Kent	**200–300 mm**
Leicester	**250–350 mm**
Shropshire	**300–450 mm**
Bristol	**400–600 mm**
Willamette Valley (Oregon)	**400–600 mm**
Osorno (Chile)	**200–300 mm**
Giresun (Turkey)	**300–400 mm**
Piedmont (Italy)	**80–120 mm**

- Hazelnuts don't like wet feet so well drained soil in essential.
- Hazelnuts are wind pollinated over winter. Greater levels of rain between November-January will affect pollination. Wetter areas should increase % of pollinators per ha.

Figure 5: Average rainfall 1991-2020

4.3 Mechanisation

Mechanisation plays an intrinsic role in the profitability of hazelnut production.

Labour availability and **labour cost** were **recurring themes** throughout my conversations with UK horticulturalists. Businesses reported **increasing difficulty** in securing reliable labour, alongside **rising employment costs**. This challenge was particularly evident because UK horticulture is predominantly perishable crops, which remain **heavily dependent** on seasonal labour for harvesting and processing.

One of the most striking differences between hazelnuts and many other horticultural crops is the degree to which **production is mechanised**. While hazelnuts are classified as a horticultural crop, modern production systems operate in a manner that more closely **resembles arable farming** than traditional orchard production.

In Oregon and Chile, production is almost **entirely mechanised**. Nuts naturally fall from the tree before being swept into rows and collected using **specialised** harvesting equipment. The process requires **minimal labour** and allows **large areas** to be harvested **quickly and efficiently**. Modern orchards are designed with mechanisation in mind, influencing everything from tree spacing and canopy structure to variety selection.

The impact of mechanisation extends beyond harvesting. Pruning, mowing, spraying and fertiliser application are all **undertaken using machinery** commonly found on arable farms. In many cases, growers were **managing several hundred hectares** with relatively small labour forces. This contrasted sharply with sectors such as top fruit, where labour often represents one of the **largest production costs** and acts as a **limit to expansion and scalability**.

Typically, hazelnuts retain one hand pruning operation per year into order to develop the **'wine glass' formation** of the plant. Though, In both Chile and Oregon, work is being undertaken to develop a '**hedgerow' system** to further **reduce labour requirement.**

The ability to establish, manage and harvest orchards using existing machinery may prove to be one of the most crucial factors facilitating future adoption in the UK, where labour costs have been a **central pressure** on businesses in recent years.

4.4 Processing infrastructure

Throughout my study, one theme emerged more consistently than any other: successful nut industries are **built around processing infrastructure** as well as orchards.

Conversations repeatedly returned to drying facilities, cleaning equipment, cracking plants, storage capacity and market access. The ability to process, aggregate and market production was often the factor determining whether an industry could **scale successfully**.

This was evident across every major producing region visited. Oregon possesses an **advanced network** of processors, handlers and exporters capable of receiving, cleaning, drying, grading and marketing large volumes of nuts. Similarly, in Italy and Chile, growers operate within established supply chains that connect orchards **directly to processors** and ultimately to global buyers such as Ferrero.

The importance of this infrastructure cannot be overstated. Unlike many annual crops, nut orchards represent a **long-term investment**. Such investments require confidence that a **route to market will exist** not only today, but throughout the life of the orchard. Processing infrastructure therefore provides more than physical capacity; it provides **confidence for investment.**

For emerging industries, this creates a significant challenge. While an individual farmer can establish an orchard independently, it is difficult for individual growers to justify investment in drying, cleaning and cracking facilities. The economics of processing generally **favour scale**. For example, whether the cost of processing a nut is £500 per Ton or £1000 per ton, the product will enter the market at the **same price,** so processing inefficiencies are **reflected back to the price paid to the farmer.** This creates a situation where growers require processors to justify planting, while processors require production volume to justify investment.

Successful industries have overcome this challenge **through collaboration**. Cooperatives, grower associations and strategic investment from processors have all played important roles in breaking this cycle. In Chile, for example, investment from Ferrero has accelerated both production and processing capacity, creating **confidence** throughout the supply chain and **encouraging further orchard establishment.**

It should be noted that, the **steep downward trend in productivity across southern Europe** offers something of a halfway house for UK farmers. The result of collapsing yields in Spain for example, is that the processing plants have vast amount of spare capacity- meaning that a UK farmer would have the ability to market into them, albeit it would be preferable for **processing to occur in the UK** in order to achieve a wide market and better prices.

For the United Kingdom, suitable soils, climate and genetics may all exist, but without a **coordinated approach** to processing and market development, production is unlikely to scale significantly and individual plantings may even prove to detriment each other as farmers collectively **target the same small local markets.** The limiting factor for a future UK hazelnut industry may not be agronomic capability, but the ability to coordinate marketing and develop infrastructure.

It is my personal aim to help **coordinate farmers** to reach the critical mass of hectares required, and **build a processing facility** to aggregate the sale of their produce.

4.5 Scale

Hazelnuts **benefit significantly** from economies of scale in the same way that **cereal cropping** does. The majority of production activities, including spraying, mowing, harvesting and transport, are mechanised. As orchard area increases, fixed costs such as machinery, labour and management can be **spread across a greater number** of hectares, **reducing cost per kilogram** of nuts produced.

However, scale is not simply a question of establishing larger orchards. Modern harvesting equipment, drying systems and handling facilities represent significant capital investments. In Oregon and Chile, these costs were often justified through large individual holdings or through **collaboration between multiple growers.** The result was production systems capable of operating efficiently at a scale difficult to achieve for individual growers acting alone.

There is a stark contrast between traditional and modern production regions. In Turkey and parts of Italy, hazelnuts are often grown on relatively small family farms, many of which have supplied the industry for generations. While these systems continue to play an important role in global production, they frequently experience **significantly higher production costs** and **lower yields** than modern, highly mechanised operations. In contrast, newer industries have generally been established around larger orchards designed from the outset for efficient management and mechanisation.

This is an important lesson for UK farmers. While farms could easily consider planting out small parcels of land, the cost of machinery, harvesting, drying and processing would quickly prove this to be folly.

Growers must **operate at sufficient scale** to achieve production efficiencies, be that individually, or through **shared infrastructure** and **collective investment.** Scale therefore exists at two levels:

The scale of the individual farm:

20-50ha is one man's work.

50-75ha justifies a harvester.

For the individual farmer, the largest fixed cost is for irrigation, which is why this paper suggests a **minimum orchard size of 20ha.**

Then, there's the scale of the processing itself:

100ha minimum for cleaning plant.

400ha minimum for cracking plant.

Again, this is an area which my aim is coordinate farmers to reach this minimum scale. The adoption of hazelnut production in the **UK has a minimum requirement** but it **does not have a maximum**. This is a **commodity market** with over **1 million tons produced** each year and **worth over £2bn** to Europe alone. For UK farmers it isn't whether they can sell their crop; it's whether they can **produce it competitively**.

4.6 Orchard Design

Orchard design broadly refers to number of trees per hectare, the spacing between trees and their spacing between rows. It also **encompasses Integrated pest management** plans **and suitability for mechanisation**. Each country visited had **different ideals** for optimal spacing, Oregon favouring 6x3m, Chile 5x3m, Belgium 7x2.5m for example. Orchards remain productive for over **40 years**, so intuitive design is vital.

Hazelnuts require pollination from a different compatible variety, therefore **every third tree in every third row** is a defined **pollinator** tree. Orchards are planted directionally to maximise 'the long work' as is typical with cereal cropping in the UK.

As a rule of thumb, it's pertinent to aim for **the highest density of trees per hectare**, without causing **shading** and whilst still able to get machinery through the field. In Chile, they were experimenting with **super high-density planting**, creating hedgerows with iterations of 5mx1m, and using **growth regulators** to reduce rooting competition. The aim of this method is to bring the **orchard into mature** production in year 4 – as opposed to year 7. Though the implication of such a method will likely be a **reduction in orchard lifespan** as is typical with modern apple orchards (From 40 years+ to about 10yrs.)

Forming a recommendation for orchard design in the UK has been one of the most nuanced issues within this study. Orchards are designed around the **tools in the farmer's** belt: be that machinery, chemicals, labour or fertilisers. Therefore, with **different tools** available to the **UK farmer** than the American farmer or the Chilean farmer, how should the orchards look? There are **three considerations** this paper suggests the UK farmer should take into account during the orchard design phase:

1. The most common chemical used to control suckering is **not available** to UK farmers.

2. Brown marmorated stink bug will likely become the **largest pest** and cannot be controlled effectively with chemicals.
3. Irrigation is the **largest** single fixed cost in orchard establishment.

Given these elements, it's recommended that either 6x3m or 6x2.5m is optimal spacing for UK farmers – allowing for 2m beetle bank every 48m. This balances getting the **maximum utility** out of the irrigation system (most trees per metre pipe) whilst also maximising workability through mechanisation. The implantation of the beetle banks reduces total tree quantity fractionally (sub 5%), with the potential to **protect yields** which can suffer up to 25% from pest pressure.

Shown overleaf is a design I made myself, showing an orchard layout with beetle banks.

See diagram on next page

Figure X. Proposed orchard layout incorporating 2 m beetle banks at 48 m intervals

Orchard rows orientated north–south (viewed from above)



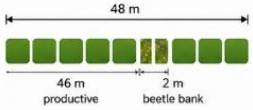
HOW IT WORKS

A 2 m wide beetle bank (flower-rich grass/hedgerow strip) replaces one tree row every 48 m. This small proportion of non-productive area delivers disproportionate benefits for biodiversity, pollination and natural pest control, while maintaining an efficient, mechanisable orchard design.

CALCULATION EXAMPLE

In a 48 m module:
- 2 m beetle bank
- 46 m productive orchard

Productive area = 46/48 = 95.8% (~4% reduction)



4.7 Agronomy

4.7.1. Varieties

Varietal trials are just beginning in the UK (Scotland, East Anglia, Welsh borders, Southern England, Midlands) . The varieties being tested are as follows: Yamhill, Dorris, Sacajewea, Jefferson, Polly O, Wepster, Tonda di Gioffani, McDonald and Nalu. These varieties **combine the crucial elements** of being within the **11-13mm** nut size bracket which the market demands, as well offering the **highest yields**. Within these varieties some have better flavour profiles which **command premiums**, while others have better **kernel to shell ratios**. They will also **vary timings** for bud break and harvesting – with the total spread for each **around a fortnight**. This trial will be essential for practical **decision-making** for farmers, as whilst there is plenty of data available on each of these varieties, understanding how they **react in specific UK contexts** will be imperative.

Variety	Relative Yield*	Kernel %	Harvest Timing	Blanching / Flavour Premium	Primary Market
McDonald	99	**51–52%**	Very Early	Excellent	Kernel
Yamhill	98	48–50%	Early	Good	Kernel
Wepster	95	47–49%	Very Early	Good	Kernel
PollyO	92	48–50%	Early-Mid	Good	Kernel
Jefferson	88	44–45%	Late	Good	Kernel
Dorris	85	47–49%	Mid	**Excellent**	Kernel
Tonda Pacifica	75	46–48%	Early-Mid	Very Good	Kernel/Premium
Sacajawea	75	45–47%	Early	Very Good	Premium Kernel
Tonda di Giffoni	75	43–46%	Mid	**Exceptional**	Premium Kernel

4.7.2 Pollination

Pollination occurs between **compatible varieties** of hazelnut. In the context of a commercial orchard, this means one 'cropping' variety and two or three compatible **pollinators**. Pollination takes place in winter when the male catkin sheds its pollen at the same time the female flower is open. Using **more than one** variety of pollinator is prudent to account for seasonal disruption. It was noted to me while visiting Italy, where the orchards are typically vey small and rely on wild hazel to pollinate them, that **climate disruption** had caused the male catkins to shed pollen at a time **no longer aligned** with the female budding. The result of this was **yield reductions** of up to 50%, with **no quick fix** – only planting new pollinators that themselves take years to grow. It is known that varieties may react differently in different climates and so it is recommended that a farmer opts for a **higher variance** of pollinators than would be typical in commercial orchards.

4.7.3 Sucker Management

One of the most significant agronomic challenges observed was the management of suckers. Hazelnuts naturally produce **vigorous shoots** from the base of the plant. Left unmanaged, these suckers **compete with the main stem**, increase pruning requirements and interfering with harvesting operations. In Oregon and Chile, **chemical control** formed an important part of sucker management. However, some of the products commonly used **are unavailable to UK growers**. This difference may prove important when designing UK production systems and partly explains the increasing interest in grafted trees and non-suckering rootstocks.

In the UK context, the best mitigation is that of the Danish farmers – who use nitrogen fertiliser to control the suckers by **'scorching'** them in the same way other chemical controls would. This is undertaken when suckers are 4-5 inches in length.

4.7.4 Weed Control and Orchard Floor Management

Due to the shallow rooting nature of hazelnuts (majority of roots within the first 60cm of soil) young trees **compete poorly with weeds** for water and nutrients, making early management critical.

Once orchards reached maturity, the focus shifts. Rather than trying to eliminate all vegetation, growers were attempting to create an orchard floor suitable for harvesting. This often involved mowing, mulching and selective herbicide use to maintain a clean surface beneath the trees. Unlike many horticultural crops, the orchard floor is effectively **part of the harvesting system**. Nuts must be swept from the ground, meaning floor management has a **direct influence** on harvesting efficiency.

This creates a question for farmers. One of the key benefits of perennial cropping is the **multifaceted nature of the land use**. Crop **production in the canopy**

leaves room for **biodiversity at ground level** whilst also **sequestering carbon** below ground. However, too much biodiversity at ground level is **detrimental to operational efficiency**. The most effective compromise was found visiting Spanish farms where mixtures of grasses and clovers where planted and grown to about 8 inches in height. This is much greater than other systems across the world and was facilitated by **replacing the rubber paddles** on the harvester with **metal 'combs'** which were able to pass more easily through the longer grass.

4.7.5 Nutrition

Interestingly, a high input crop of hazelnuts is typically **lower input** than a **low input crop of wheat**. Partly because nutrition is applied through fertigation (within the irrigation system) which works as a **precision application** tool and partly, because of the nature of perennial crops. Growers also note small applications of boron help with nut set and reduce blanks (empty shells). Having a relatively low requirement of chemical inputs compared to cereal farming is an attractive prospect for farmers as it is of itself, a **mitigation** or rather an **insulation** against **global supply chain shocks** which appear to be occurring with greater frequency.

Figure 6 Base nutrition requirements of hazelnuts

Nutrient	Typical annual requirement
Nitrogen (N)	80–120 kg/ha
Phosphate (P_2O_5)	10–30 kg/ha
Potash (K_2O)	80–150 kg/ha

In spite of the cost, irrigation is something that is **recommended for all growers**. The UK climate is favourable in the sense that it receives rainfall all year round, but increasing frequency of drought, particularly during establishment, poses a dramatic **risk to productivity**. The **first three years** of the tree's life are critical to how it will produce for the **remainder of its lifespan**. A stunted tree in the first 3 years will **never recover** to full production. Therefore, it is safest and most prudent to have some mechanism in place to ensure the tree can access water whenever they need it.

The amount of water a mature tree needs is difficult to quantify as it depends on soil type and rainfall. Estimates can be provided through examples: One American farmer on clay soils with no rainfall in summer may use 25L per tree per

day, whilst a Spanish farmer on lighter soils, also with no summer rainfall may require over 70L.

4.7.6 Harvesting

Harvesting takes place after the nuts have fallen naturally to the floor. They are swept off the ground by mechanised harvesters that somewhat resemble the road sweepers we would be familiar with in the UK. Similar to the harvesters we're familiar with, **different machines** have **different capacities**. For efficient commercial usage, the harvester should be able to cover between half a hectare and one hectare per hour. The capital outlay for such equipment, similar with those we're familiar with, is **vast**, ranging between £100,000-£200,000 for respective specs. A machine of the highest capacity would typically be utilised on farms of about 75ha. This is another element of production where **collaboration** within close local geography could prove **vital to the success** of UK farmers. **Shared utilisation** of equipment not only keeps each individual farm with the **lowest possible fixed cost** (maximum capacity, minimum capital expenditure) but helps **spread risk** collectively.

4.8 Economics

This part of the report was fascinating to research. The deeper I got into the economics of hazelnut production, the deeper too, came my interest with the economics of comparable crops. Hazelnuts sit in a somewhat **unique position** between top fruit and cereal crops. The specification of the produce is more like cereals while the agronomy is more like top fruit. The costs associated also sit somewhere between the two. The comparables I was particularly interested in were: **Top fruit, vineyards, cider apples and cereals**.

The chart below illustrates different establishment costs for these crops. The next chart after that shows the expected net return. Please note these graphs do no not consider years until production, or lifespan of the different orchards. The chart below is based on conversations with different farmers in the UK plus my own orchard cost assumption.

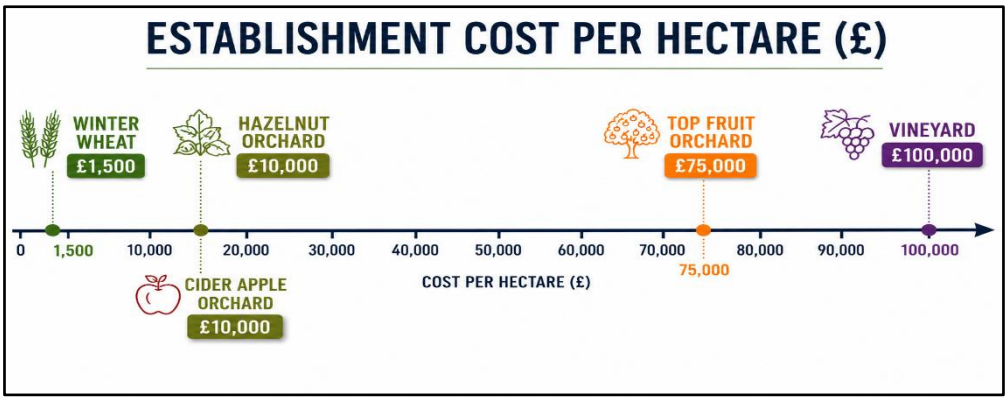


Figure 7 Establishment cost per hectare

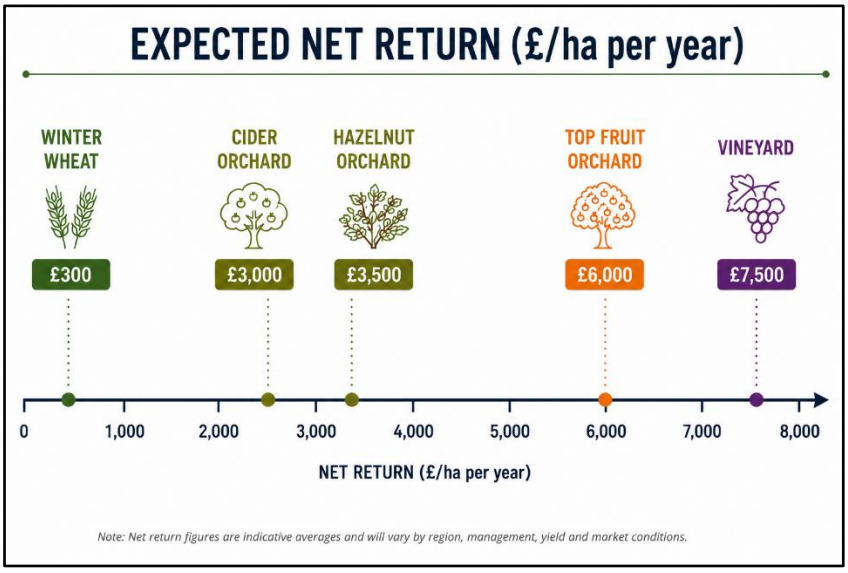


Figure 8: Expected net return .

Based on conversations with different farmers in the UK plus my own orchard cost assumption.

The figures attached in this section are indicative and based upon comparable businesses: in Europe, the USA, Chile and top fruit farmers within the UK.

Item	£/ha (approx.)	Notes
Trees	3,150	Planting stock incl. delivery
Guards	500	Spirals/mesh + stakes
Labour	1,500–2,000	Planting, training, pruning setup

Irrigation	3,000–3,500	Drip lines, pumping, installation
Fencing	1,500–2,000	Perimeter rabbit/deer protection
Site prep	500–1,000	Ground prep, soil amendments
Total	~10,000	Typical all-in establishment

Figure 9: Establishment Costs based on 20 ha orchard

Activity	£/ha	Notes
Sucker control	500	Spraying and/or mechanical removal
Harvesting	500	Mechanised sweepers and pickers
Pruning	500	Annual pruning plus occasional thinning
Weed control / mowing	350	Mulching and grass cutting
Fertiliser & soil care	350	NPK, compost, lime and soil amendments
Insurance & administration	300	Crop insurance, compliance and administration
Machinery depreciation	300	Tractors, sprayers and harvesting equipment
Pest & disease control	250	Fungicides and insecticides
Irrigation	250	Energy and system maintenance
Supervision / labour management	200	Skilled labour and management oversight
Contingency / replanting	200	Tree losses and unexpected pest outbreaks
Infrastructure upkeep	100	Drainage, fencing and access tracks
Advisory & certification	100	Agronomy, Red Tractor, organic certification etc.
Total	**3,800**	**All-in annual cost at maturity**

Figure 10: Annual running costs based on 20ha orchard

Orchard Age	Cost (£/ha)
Years 1–4	1,000
Year 5	1,500

Orchard Age	Cost (£/ha)
Year 6	2,000
Year 7 onwards (steady state)	3,500–3,800

Figure 11: Ramping up of annual maintenance costs based on 20ha orchard

Yield Profile

• Year 5: ~25% yield (~0.8 t/ha)

• Year 6: ~50% yield (~1.6 t/ha)

• Year 7+: Full yield ~3.0–3.5 t/ha (in-shell)

Cleaning Costs

• Cleaning plant fee: ~£100/t at delivery

Revenue & Net Profit (per hectare, at full yield)

• At £3,000/t in-shell: – 3.0 t/ha → £9,000 gross → ~£5,100 net – 3.5 t/ha → £10,500 gross → ~£6,700 net • Net margin: ~£5,000–7,000/ha/yr once mature

Net Profit Sensitivity (per hectare)

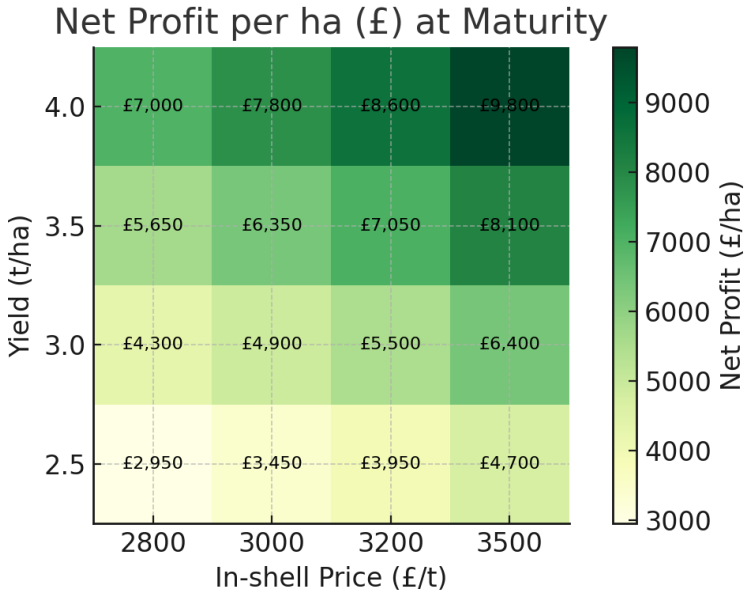


Figure 12: Net Profit sensitivity per hectare

Summary for Farmers

• One-off investment: ~£10,000/ha

• Break-even: ~9 years after planting (including early maintenance)

• Long-term net return: £5,000–7,000/ha/yr

• Strong demand for traceable and sustainable hazelnuts

Establishment cost	£10,000/ha
Peak cash deficit	~£14,000/ha
Break-even	Year 9
Mature net profit	£5,100–6,700/ha
Orchard life	40+ years
IRR	~10–15%

Figure 13: Chart to summarise essential figures

4.9 Funding and the payback gap

Farmers in the UK will be aware of **various incentives** to plant trees on their land through agroforestry payments and woodland creation grants. It is the opinion of this paper that such funding mechanisms, whilst they may seem attractive, are **prohibitive** to the **long-term viability** of orchard production due to the stipulations attributed to them, typically specifying certain planting densities and varietal diversity. In contrast utilising capital grants such as fencing may **directly reduce** establishment costs without prohibition, as well as 'trade off' grants such as hedge planting may provide surplus capital for farmers to use to invest in their orchards. It is also not uncommon for farmers to grow other crops in between their rows during the unproductive years, though this requires careful crop selection.

The funding gap is the largest barrier to adoption of hazelnut production in the UK. The **establishment costs are low compared** with other horticultural crops, but the delay of **7 years before full production** is challenging for farmers to overcome.

CHAPTER 5: DISCUSSION

The aim of this study was to answer a simple question: can hazelnuts become a commercially viable crop for UK farmers?

Having visited **established and emerging** production regions across North America, Europe and South America, I believe the **answer is yes**. However, this answer comes with an important caveat. The challenge to UK production is not whether the nuts can be grown, but *whether the infrastructure* can be grown to facilitate them.

Climate and soil are undoubtedly important, but where those are present, they are not the factors that **determine industry success**. Successful industries are characterised by **coordinated supply chains**, efficient **processing infrastructure** and clear **routes to market.**

In many respects, the UK compares favourably with established producing regions. Rainfall is generally reliable, heat stress is limited and chill hour accumulation is sufficient across much of the country. Better yet, unlike traditional producing regions, the UK has the advantage of starting with a **blank sheet of paper.** New orchards can be established using modern genetics, high-density systems and the latest technologies.

Paradoxically, **arriving late** may represent an **advantage**. Throughout Oregon and Chile, I observed the benefits of modern **breeding programmes**, **mechanisation** and **optimised orchard design**. While traditional regions such as Turkey and parts of Italy continue to dominate global production, they are challenged by **lower productivity**, **fragmented ownership** structures and **higher production costs.**

At the same time, the global industry is entering a period of significant change. Climate change is **increasing pressure** on traditional production regions, particularly through **water scarcity** and **seasonal disruption**. When Turkey, which produces **750,000T** annually, had a **35% loss** of annual production in 2025 - it is an **opportunity** for other regions. The question is: how to make the most of this opportunity?

In addition to climate instability, **geopolitics** and **traceability** also has an affect on global production **sentiment**. Conversations I had within the industry state that purchasers are trying **desperately to divest** from Turkish reliance. Not simply for climatic resilience but issues of **traceability** and **ethics** too. In this sector the purchaser is often also the retailer (as in the case of Ferrero).

This means public furore caused by **allegations** of **Syrian slave labour** in Turkey for example, cannot be passed to a different organisation in the supply chain and **sales are affected**.

Attending the annual meeting of British dried fruit and nut traders, one nut trader spoke to me of **'market manipulation'** and price fixing due to the **dominance of supply**. Another spoke to me about purchasing a ton of Kernels for £12,000, only to have the **contract ripped up** before shipping and told: if you still want them the price is now £20,000. These conversations **crystalised yet another advantag**e of UK production: We are known and **respected** for having some of the highest production standards and ethics in the world.

In every country I saw a different piece of best practice. A different lead issue and a different methodology of problem solving. I have had the privilege to ask growers from across the world: **If you were to start again from scratch, how would you do it?**

Applying these learnings at a grower level should be entirely possible. However, I don't believe growing the crop is the challenge. What Turkey has which makes it the **dominant force** in hazelnut production is **scale and processing** capacity. Here is the most significant barrier facing UK farmers. It's the age-old **chicken-and-egg problem.** Growers are reluctant to plant orchards without confidence in processing and market access. Equally, processors are unlikely to invest without confidence that sufficient production volume will exist. This challenge initially seemed insurmountable, until I visited countries where it had been.

In several countries, through **grower cooperation,** a **standardisation of production** was formed and **processing was built**. In France in the 1970's, five farmers set about building an industry. Today it encompasses **nearly 10,000 ha** and at its peak, saw **500 ha per year planted**. The lesson for the UK is clear: **industry infrastructure must develop alongside production**.

Given the current climate UK farming. It is **now more than ever, that we, the farmers,** must take action to **take back control of our own futures**.

I don't believe the question is **whether** hazelnuts can be grown successfully in the United Kingdom. The question is whether growers are willing to **cooperate** to **create the conditions** necessary for a viable industry to emerge.

Out of every crop I've researched over past few years**, I believe hazelnuts have the greatest potential of any.**

CHAPTER 6: DISRUPTING FACTORS

Over the course of the study, **themes began to present themselves**. Across nations and regions with very few similarities, **patterns of change** were evident. Much time was spent reflecting not just on the different traditional and modern systems – but **what the next wave of modern systems would be built for.** The UK does not have a hazelnut industry, so if it were to develop one, what are the disrupting factors it needs to consider?

This section collates and highlights recurring themes that will affect hazelnut production worldwide to try to ensure UK farmers are equipped for these changes.

6.1 Genetics

The largest gains in productivity observed during this study originated from **advances in genetics.**

The significance of these developments extends beyond productivity alone. Modern breeding programmes have focused on reducing tree size, improving kernel-to-shell ratios, increasing disease resistance and producing nuts that meet increasingly precise market specifications. The result is a generation of cultivars capable of producing in some cases **double the yields** of more traditional varieties. It was framed to me in this way by a grower in France **"Picking the variety with the highest inherent yield potential is the best defence against pests and poor seasons".**

Importantly, these advances are not restricted to established production regions. New entrants have the **opportunity** to establish orchards using only **the most advanced** genetics available, bypassing the **sunken costs of older orchards**. The productivity gap between traditional and modern systems, combined with the increased pest pressure across the world, is now so significant that genetics may become in and of themselves a key driver in international competitiveness.

6.2 Grafting and Non-Suckering Rootstocks

One of the most coveted developments within the industry is grafted trees on **non-suckering** rootstocks. Traditionally, hazelnuts are grown on their own roots, producing suckers throughout the life of the orchard. The removal of these suckers represents one of the largest **ongoing management costs** within commercial production systems.

Whilst relatively novel and not widely adopted, grafted systems have the potential to significantly alter orchard economics. By reducing or eliminating

sucker control, growers may be able to **lower labour requirements** and reduce herbicide use. In the UK context, this is particularly interesting as the chemicals used to control sucker growth in Oregon and Chile are **prohibited under UK law.**

Separately, grafted rootstock may **facilitate higher planting densities** which would be **transformative** to orchard economics. The effect of higher density is faster return on investment - currently the biggest economic barrier to hazelnut production. The development of these hedgerow systems also further aid mechanisation and automation of pruning- another important annual cost. Non-suckering and dwarf rootstocks have the potential to influence the hazelnut industry in a similar way to dwarfing rootstocks within apple production, fundamentally changing orchard design and management.

6.3 Emerging Pest Pressures

Whilst technological advances are improving productivity, increasing pest pressure threaten to offset some of these gains. **Brown Marmorated Stink Bug** has emerged as one of the most significant threats facing global horticulture. Already established across large areas of Europe and North America, the pest can cause **substantial damage** to nut quality and marketability.

The spread of invasive pests highlights the increasing interconnectedness of global agriculture. As trade increases and climatic conditions change, pests and diseases are likely to establish themselves in new regions with increasing frequency. The UK **currently does not** have any reports of Brown marmorated stink bug, but any future industry must plan for its **inevitable arrival.** Success will depend not only on productivity gains, but also on the ability of growers to develop **resilient production systems** capable of responding to emerging biological threats. Due to the low efficacy of conventional controls, it is recommended that UK farmers utilise an integrated pest management plan – incorporated at the design stage of the orchards development. As shown in the infographic in the earlier section on orchard design, on page 16 in Chapter 4.6

6.4 Climate Change

Climate change is perhaps the **most significant** long-term force acting upon the global hazelnut industry. Throughout this study, growers in traditional producing regions repeatedly highlighted concerns regarding drought, water availability, extreme summer temperatures and increasingly **unpredictable weather patterns**.

In Spain, declining winter chill accumulation and increasing summer heat have already contributed to **substantial reductions** in productivity **(from 2.2T/ha to 0.8t/ha)** for the past **six years in a row.** Similar concerns were raised across Italy, where water availability is becoming an increasingly important issue - many orchards are planted in the mountains and are **unable to drill boreholes**.

Seasonal disruption was affecting the **pollination process** with male catkins and female buds timings **no longer aligning.**

At the same time, interest in hazelnut production is expanding into more northerly regions. Countries such as the Netherlands, Belgium and Denmark are establishing commercial orchards in areas **previously not considered**. These developments suggest that climatic suitability for hazelnut production may continue to shift northwards over coming decades. Data attained from these more northerly countries should give UK farmers **the greatest optimism** to pursue hazelnut production, as it appears the crops in these more northerly countries are **producing** similarly to those in Oregon and Chile.

CHAPTER 7: RECOMMENDATIONS FOR BUILDING A UK HAZELNUT INDUSTRY

7.1 Suitable Geographies

A question that was generated by the findings of how climate change is affecting production zones was: **Where else in the world could hazelnuts be produced in the future?**

The area *capable* of growing hazelnuts is significantly larger than the area where hazelnuts represent the *most profitable* crop. Suitable chill hours, moderate summer temperatures, adequate water availability and sunny springs remain essential, but economic factors are equally important too. In many regions capable of producing excellent hazelnut crops, **alternative crops** such as vineyards, olives, and citrus production are also available – and more profitable.

Future expansion is therefore most likely to occur in regions that combine favourable climate, moderate land values, access to infrastructure and an **absence of more profitable crops**. These are criteria the UK sits firmly within. The map of global hazelnut production may look very different in twenty years' time and the UK is in a strong position to benefit from these changes.

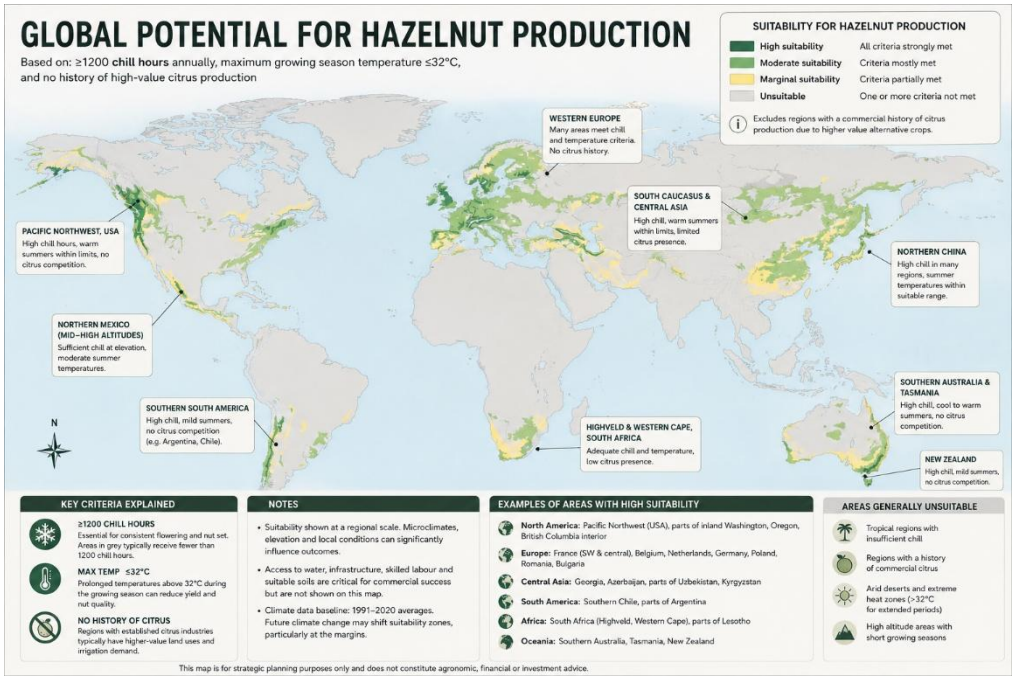


Figure 14: Map compiled by the author using climatic and economic assumptions

So my Recommendations are:

7.2 Recommendations

Recommendation 1: Standardise Production

For the UK to establish a successful hazelnut industry, we first need to understand how **the market works** and **what it wants**.

I recall speaking with a nursery selling traditional English hazelnut varieties when I bought my first trees. They told me sales were almost **doubling year on year**. The problem was that the sector **wasn't growing in any coordinated way**. It was 100 trees of one variety, 50 of another, 25 of something else. I know because I bought them.

Most of these varieties produced nuts **larger than 18mm** which **excludes** them from **95% of market opportunities**. The only realistic outlets were farm shops, farmers' markets and direct sales. At the time that didn't seem like a problem to me, because no one else was growing hazelnuts.

Shortly afterwards, I bumped into a neighbour around 25 minutes from my own farm. He'd planted around 20 acres of hazelnuts the same year. When I asked where he intended to sell them, his answer was: local farm shops and farmers' markets.

We looked at each other and realised that between the two of us we'd probably **already saturated the local market.**

Since then I've spoken to dozens of farmers across the UK doing **exactly the same thing**. Planting a mixture of varieties, often with little understanding of the final market, the required specification, the likely price or even who the eventual buyer might be.

If this continues, the UK won't build an industry. We'll build a collection of small producers all **competing for the same local customers.** Those markets will become saturated, prices fall and enthusiasm disappears.

The successful hazelnut industries I visited did the opposite. They **standardised**. They selected a small number of optimal varieties based on **market requirements.** They produced a consistent product and built the **processing** and **marketing** systems around them. Growers knew what they were producing before they planted the first tree.

The UK must do the same.

This does not mean abandoning local markets. Farm shops, farmers' markets and direct sales will always have a place. The difference is that growers **should access them by choice**, not because they have excluded themselves from every other opportunity.

By **standardising production** around **proven, high-yielding** varieties that meet established **market specifications**, growers gain access to the scale of the commodity market whilst retaining the flexibility to pursue premium opportunities where they exist.

Standardising production also refers to optimising orchard design for the **challenges of the future,** not just today. This is where the UK has the greatest advantage over other nations. Unlike Turkey, Italy or Spain, we **have no legacy production system to inherit.**

"That's how we've always done it" is the sound of **innovation being suffocated.**

We can design orchards around the challenges the industry expects to face over the **next twenty years** rather than the challenges of the previous fifty.

We need to plant varieties with highest yield potential. We can incorporate biodiversity, water management and climate resilience into the design before the first tree is planted.

Consistency of varieties. Consistency of orchard design. Consistency of harvesting systems. Consistency of the final product will together ensure long term sustainability for UK farmers.

The opportunity is not to replicate the world's existing hazelnut industries. It's to build the next generation of them.

Recommendation 2: Centralise Processing

Every successful industry I visited was predicated on scaled processing facilities. **You don't process a hazelnut to add value. You process them to access the marke**t and without market access, you don't have a business let alone an industry.

The reality is that the majority of hazelnuts are sold into the commodity market. This isn't a bad thing. It's a **guaranteed market** which has **clear specifications** and offers margins that can be **forecasted** by the farmers ahead of time. To ensure profitability, farmers need to **produce each unit at the lowest possible cost** and processing makes up part of that production cost.

Whether it costs £500 per tonne or £1,000 per tonne to process a hazelnut, the final product enters the market at the same price. The only difference is how much money is left for the farmer.

The consequence of this is simple. **Small-scale processing makes farmers poorer.**

If every grower attempts to build their own cleaning plant, drying system and storage facility, the industry will burden itself with **huge fixed costs** before it has even begun – and **no one will be competitive**.

The UK must avoid making this mistake.

Instead of building dozens of small processing facilities, we need **one** capable of **serving the entire industry**. Growers should focus on producing nuts. The industry should focus on processing them as efficiently as possible.

This is yet another element where the UK's lack of historic hazelnut culture is an **advantage.** We have not inherited old processing plants with high running costs. Technology continues to accelerate, reducing labour and increase efficiency at every turn.

This is evident when viewing the production costs of Chile vs Turkey. Turkey has almost 6 times a greater scale than Chile but has a cost of production of nearly 3 times.

If **standardised production** is the first pillar of a UK hazelnut industry, **centralised processing** must be the second. They must come **to fruition in tandem**. Coordinating and facilitating this simultaneous adoption will be the difference between success and failure.

Recommendation 3: The British Hazelnut Association

The British Hazelnut association was formed by myself, Claire Donkin, Dr Alexandra Hyde and Marko Madjarac to galvanise recommendations 1 and 2. This paper suggests that UK farmers are as **well positioned** as any others in the world to **capitalise** on **the shifting hazelnut production** regions.

Growing conditions are adequate and by applying best practice and modern technology we can claim an advantage over less flexible traditional regions. The potential gains are without limit; however, they **require coordination.**

The British Hazelnut Association will advise growers on the **varieties** they need to plant. How to **design** their orchards and help them **link together** in clusters to ensure **maximum collaboration** (reducing fixed costs wherever possible).

The British Hazelnut Association will also aim to bridge the **confidence gap** and propagate planting simultaneously with **processing capacity**. We know from the sheer increase in hazelnut sales over the past 5 years that farmers are looking at this with increasing interest. Our aim will be to ensure hazelnuts **work for everyone**, for the long term.

CHAPTER 8: AFTER MY STUDY TOUR

The pace at which my thinking and ambition accelerated over the course of this study has been exhausting, energising and remarkable.

I realised that successful industries do not emerge by accident. Across every country visited, production was supported by collaboration between growers. Climate is essential to grow a hazelnut but an industry is **driven by people** working towards a common objective.

This realisation was my lightbulb moment. I went from viewing hazelnuts simply as a diversification opportunity for my own farm, to an **opportunity for farmers across the UK.**

I had undertaken half my travels before the Nuffield CSC in March 2025 and by June, before even concluding them, I began sharing what I had learned at various events. By January I had spoken at Groundswell, Oxford Farming Conference, Oxford Real Farming Conference, The Agroforestry Show, ADHD roadshow and numerous local events.

By March, along with farmers I connected with at these events, we had established the British Hazelnut Association, an organisation intended to support growers, **standardise production and centralise processing.**

By May our group consisted of over 20 farmers from across the country who are all planting varietal trials this autumn. In July we learned that this effort would also be backed by the ADOPT innovation grant – dramatically increasing the quality of the results we will be able to capture.

Our groups aim is not to plant 10,000 ha, but to create a system **that makes 10,000 ha possible.** A commercial UK nut industry is in its infancy, but I'm increasingly **optimistic about its potential.**

The combination of changing climatic conditions, advances in genetics, growing interest from farmers and, frankly, necessity creates an opportunity that may not have existed a generation ago. That opportunity will require **patience, investment** and **collaboration**, but the foundations are beginning to emerge.

Perhaps the greatest lesson from all the regions I've visited, is that success is not something that happens to farmers. It's something that farmers themselves can create. Whether or not hazelnuts ultimately become a mainstream crop in the United Kingdom remains to be seen, but the process of **building that possibility has begun.**

CHAPTER 9: ACKNOWLEDGEMENT AND THANKS

The Becketts

I'm extremely grateful to **Anne and Simon Beckett** for supporting this scholarship and enabling me to undertake the study. The Beckett award was set up by **Alan Beckett**, whom sadly I never met, to help farmers help themselves. He believed in new possibilities and better ways of doing things. Their sponsorship holds a space for farmers like me to pursue their ambitions, in my case before I really understood what they were myself.

Simon Beckett is perceived as one of the most terrifying men in Nuffield. I smile to myself as I write this because dare I say, my experience has been one only of a genuinely kind man who has treated me with interest and equal respect whilst it was a fact that he is patron and I am the beneficiary. He's shared knowledge freely and I've felt his confidence throughout my study.

My greatest thanks are to Anne, who has been omnipotent throughout my study. It has been a gift to share some of her energy and reflections of Nuffield as she is someone who's experience of it is unparalleled. I feel extremely fortunate to have been sponsored by this group, one which remains after the study finishes and one that encourages it's alumni through every stage of their journeys.

My final thought of this paper was that farmers need to take control of their own futures. As I reflect upon finishing it, I realise that has been the central message of the Beckett award throughout too.

Nuffield Farming Trust

The Nuffield Farming Scholarship has been one of the most rewarding and transformative experiences of my life. I would like to thank the Nuffield Farming Scholarships Trust, the chairman and the staff who have ensured our experience was the best possible one. It is a pleasure to be part of this network and I am already benefitting from it's provenance and the credibility it brings to me as an individual.

Shawn Mehlenbacher

Shawn Mehlenchacher's work leading the Oregon State University's breeding program maybe the single greatest contribution to the hazelnut industry In it's history. I would like to thank him for his time and for informing me so broadly whilst I was visiting.

Jimmy Lee

Jimmy was the first farmer I met in Oregon, and it is him that I must credit with helping me understand the scales important for hazelnut farming and making me consider production not as a single farmer but with the potential of an industry.

Camillo Scococco

Camillo is the head of Ferrero in Chile, their largest single operation. This is a man who has a twinkle in his eye, took me seriously and gave me more time than I'm sure he could afford to. I would like to acknowledge the motivation I left our meeting with and his guidance after I returned home.

Rian Vletter, Jorge Mohr, Pierre-Olivier Bonhomme, Benoit Genin

These men are true pioneers of northern European hazelnut production. Pierre and Benoit have already achieved what my paper outlines, from a standing start in Belgium. It was their work that made me believe mine was possible. They have been friends and advisors to me throughout the study and provided me with the roadmap I so desperately needed to make the progress I hope to.

Rian was responsible for connecting me with all of my European contacts, many of whom without his help, I wouldn't have been able to meet (I had already received rejection letters from a few). Rian is a key player in Northern European hazelnut production and plays a role as the hub within the growing hub and spoke that is this developing sector in our regions.

Jorge, likewise, is a life long pioneer of improved genetics, farming and processing. His work is a one stop shop for someone like myself who before this study, knew so little on this topic. I appreciate his time in both Chile and Holland and over the phone over these past two years.

The British Hazelnut Association founders

It's with huge excitement that I'd like to thank Claire Donkin, Dr Alexandra Hyde and Marko Madjarac, my co-founders of the BHA. We met pursuing the same goal, have different complementary skills and have inspired each other. Our work is only just beginning but I could not have asked for a better group to be embarking on it with.

David McVeigh

My final thanks are to my father who has been long suffering helping me try to achieve my goals and better myself. I'm amazed how, in different generations and contexts we have so many shared experiences. He offers advise without expectation and hopes to encourage me at every turn. In an industry where farmers are dedicated to cultivating crops but often take less attention trying to cultivate their children, I am very thankful.



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